PATENT APPLICATION
Docket No: 14321.84

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of		)
	Ryuzo Iga et al.	)
Serial No.:	10/577,626	) Art Unit 2828
Filed:	April 28, 2006	)
Confirmation No.:	9935	)
For:	SEMICONDUCTOR OPTICAL DEVICE AND A METHOD OF FABRICATING THE SAME	)

INFORMATION DISCLOSURE STATEMENT
UNDER 37 C.F.R. § 1.97

Commissioner for Patents
PO Box 1450
Alexandria, Virginia 22313-1450

Sir:

Please find, pursuant to 37 C.F.R. § 1.98(a)(1), the enclosed Form PTO-1449 which contains a list of all patents, publications, or other items that have come to the attention of one or more of the individuals designated in 37 C.F.R. § 1.56(c). While no representation is made that these references may be "prior art" within the meaning of that term under 35 U.S.C. §§ 102 or 103, the enclosed listed references are disclosed so as to fully comply with the duty of disclosure set forth in 37 C.F.R. § 1.56.

Moreover, while no representation is made that a specific search of office files or patent office records has been conducted or that no better art exists, the undersigned attorney of record believes that the enclosed art is the closest to the claimed invention (taken in its entirety) of which the undersigned is presently aware, and no art which is closer to the claimed invention (taken in its entirety) has been knowingly withheld.

In accordance with 37 C.F.R. §§ 1.97 and 1.98, a copy of each of the listed references or relevant portion thereof that is not a US patent document is also enclosed.

Statement of Relevance of References Listed
Unaccompanied by English Translation
Under 37 CFR § 1.98(a)(3)

In accordance with 37 CFR § 1.98(a)(3), the following concise explanation of the relevance of each listed reference that is not in the English language and unaccompanied by a translation into English is provided.

Japanese Publication No. 05-021891: PURPOSE: To flatten a buried layer by employing a high concentration n type InP using a group VI dopant upon its being buried and grown. CONSTITUTION: A mesa construction is formed by depositing an active layer 2 and a p-type InP cladding layer 3 on an n type semiconductor substrate 1a or on that on which an n-type InP buffer layer 1b is formed, masking a substrate 1a surface into a stripe shape, and selectively etching the cladding layer 3, an active layer 2, and the buffer layer 1b or the substrate la. Then, a region other than the mesa construction is buried with a p-type InP current blocking layer 5 and an n-type InP current confinement layer 6 using a group VI dopant by the use of a mask on the mesa construction upper surface. Further, the mask on the mesa construction upper surface is removed, and a p-type InP cladding layer 7 and a p-type capping layer 8 are deposited over the entire surface of the substrate 1a. Hereby, the n-type InP buried layer is flattened to improve the performance.

Japanese Publication No. 05-102607: PURPOSE: To materialize the condition that an n-type InP layer does not grow on the mesa structure, and manufacture a high-performance semiconductor laser by the burying growth by the method of organic metal vapor growth by one time using the mesa structure without a selective mask, by using the high-concentration n-type InP using group VI dopant such as Se, etc., at the time of burying growth of mesa structure. CONSTITUTION: An active layer 2 and a p-type InP clad layer 3 are stacked on the substrate, where an n-type InP buffer layer 1b is made on the n-type InP semiconductor substrate 1a, by organic metal vapor growth method. And the surface of this substrate is masked in the shape of a mask, and the clad layer 3, the active layer 2, and the buffer layer 1b are etched selectively so as to make mesa structure. Then, the mask on the mesa structure is removed, and a p-type InP current block layer 5, an Se dopant n-type InP current shut-in layer 6, a p-type InP clad layer 7, and a p-type cap layer 8 are stacked in order all over the surface of the substrate by organic metal vapor growth method.

Japanese Publication No. 06-177482: PURPOSE: To form a semiconductor laser having self-alignment buried structure by using a P-type semiconductor substrate while growing a crystal once. CONSTITUTION: The surface of a P-type semiconductor substrate 11 is mesa-etched to form a striped mesa 11A, and an N-type InP current constriction layer 13 containing selenium in high concentration is grown on the P-type semiconductor substrate 11, to which the mesa 11A is shaped, and the mesa 11A is self-aligned and buried. Various semiconductor layers required for constituting a semiconductor laser, a P-type InP clad layer 14, an InGaAsP active layer 15, an N-type InP clad layer 16, an N-type InGaAsP contact layer 17, etc., are grown, and an insulating film with an electrode contact window and an N-side electrode and a P-side electrode are formed by applying a normal technique.

Japanese Publication No. 06-283816: PURPOSE: To fabricate a semiconductor laser having an embedded structure, which can function at a low threshold level with high efficiency, without requiring any complicated fabrication step. CONSTITUTION: When a current confinement layer 5 is formed by vapor phase epitaxial growth of n-type InP, concentration of Se to be doped is set at 8X10<18>cm<-3> or above thus preventing deposition of the n-type InP on the (100) crystal face above a mesa stripe. Since the n-type InP is not grown on the upper plane including the (100) crystal face at the mesa stripe part of a clad layer 4, a current confinement layer 5 is formed such that the extensions of the upper plane including the (100) crystal plane at the mesa stripe part of the clad layer 4 are coplanar therewith on the opposite sides.

Japanese Publication No. 07-202317: PURPOSE: To manufacture an embedded structure semiconductor laser with small element capacity embedded with a semiinsulating layer by means of a simple fabrication process. CONSTITUTION: An n-type InP layer 3, an undoped InGaAsP layer 4 and a p-type InP layer 5 are grown by means of a MOVPE method on an n-type InP substrate 1, and a mesa structure is formed in a <011> direction by photolithography and etching. Then a Fe doped semi-insulation InP layer 6 and a Se-doped N-type InP layer 7 are grown by the MOVPE method. At this time, if Se-doping concentration of the n-type InP layer 7 is 8X10<8>cm<-3> or more, growth of the n-type InP layer 7 at the summit of a ridge structure is suppressed, so that the n-type InP layer 7 may not be deposited on the summit of the ridge structure. Then a p-type InP layer 8 and a p-type InGaAsP layer 9 are grown, and at this time Zn diffuses from the p-type InP layer 8 into the Fe-doped semi-insulation InP layer 6, whereby the Fe-doped semi-insulation InP layer 6a growing on the mesa structure is made a p-type.

Japanese Publication No. 09-283846: PROBLEM TO BE SOLVED: To produce an InGaAsP semiconductor laser having a carrier confining structure in the horizontal direction of an active layer at a single production process, without exposing the side face of the active layer to the outside at the mesa etching. SOLUTION: A Se-doped n-type InP block layer 107 is crystal-grown selectively at the mesa side face only by setting the doping concn. to about 2× 10<19> cm<-3> . The dopant Se in this block layer 107 diffuses in an n-type InP cap layer 106 and an InGaAs/InGaAsP quantum well active layer 105 at the mesa side face adjacent to the block layer 107, resulting in that the cap layer 106 and the active layer 105 become disordered with diffusion of Se into an InGaAsP mixed crystal 112.

Japanese Publication No. 2000-260714: See U.S. Patent No. 6,300,153 for translation of application.

Japanese Publication No. 2001-298240: See U.S. Publication No. 2001/0030327 for translation of application.

Japanese Publication No. 2003-60311: See U.S. Publication No. 2003/0067010 for translation of application.

Japanese Publication No. 2004-119467: See U.S. Publication No. 2004/0057483 for translation of application.

Dated this 2nd day of April 2007.

Respectfully submitted,

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